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Variations in Strains and Species of *Verticillium*

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The production of polygalacturonase (PG), pectin-methyl-esterase (PME) and carboxymethylcellulase (C_x) by six isolates of *Verticillium albo-atrum* Reinke et Berth., six isolates of *V. dahliae* Kleb. and single isolates each of *V. tricorpus*, *V. theobromae*, *V. nigrescens*, *V. nubilum*, and *V. lateritium* is variable when glucose, pectin and carboxymethylcellulose are used separately as carbon sources in culture under constant conditions of medium and temperature in the dark. Some strains and species do not show PG-activity although thiobarbituric acid-detectable substances are present in their enzyme reaction mixture. No C_x - activity was detectable in any culture in the presence of either glucose or pectin. All strains and species produce C_x only in the presence of cellulosic substances. Thus in all these strains and species C_x is inducible and PG and PME are produced constitutively.

All strains and species grown under constant conditions of medium and temperature in either dark or light vary in the production of spore, protein, pigment and dry weight of mycelium. Partial ultraviolet radiation suppresses the production of spores and pigments differently in all cases. These differences provide a basis for the designation of strains and species.



Histological Changes During the Verticillium Wilting Syndrome in Susceptible and Tolerant Lucerne Cultivars

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Verticillium-susceptible (Du Puits) and tolerant (Swedish cv) cultivars are characterized by a number of host reactions. The Swedish cultivar showed resistance to disease expression at all levels of inoculum concentration with a lucerne isolate of *Verticillium albo-atrum* Reinke et Berth. Delayed root penetration and slight colonization of the shoot are correlated with heavy lignification and suberization of the root-endodermis and frequent formation of tylosis in the vessels of the shoot. Tylosis formation was not in accordance with disease expression. None of the infected plants wilted seriously or died and new shoot-growth started immediately after infection to produce a large number of secondary vascular tissues and bast fibres frequently containing fungal hyphae surrounded by dividing cells.

The cultivar Du Puits was severely diseased at the lowest level of inoculum. Vascular browning was always observed. Primary and secondary xylem of all infected plants contained hyphae and brown staining gels which blocked a large number of vessels. In some cases branched hyphae and possibly conidiophore formation were observed. In Du Puits susceptibility is directly proportional to the amount of hyphae present in the vessels, while in Swedish cultivar a physiological resistance mechanism independent of the degree of colonization appeared to operate.



